



**Math Solutions®**

FOUNDED BY MARILYN BURNS

# **BUILDING MATHEMATICAL COMMUNITIES: FOSTERING MATHEMATICAL LEARNERS**

**NCSM – NEW ORLEANS  
APRIL 7, 2014**

# Welcome

**Math Solutions,**  
**founded by Marilyn Burns,**  
**has been**  
**transforming instruction**  
**for almost 30 years**  
**by providing**  
**the highest quality**  
**professional learning,**  
**coaching, and**  
**award-winning**  
**resources.**

**SCHOLASTIC**  
ACHIEVEMENT PARTNERS™



# Overview of Hour

- Learning Communities
- Constructive Struggle
- Growth Mindset

# Communities of Learners – Setting Norms

- When solving problems, what do you want others to know about you as a learner of mathematics?
- How can others support you as you learn mathematics?
- When you are solving a problem, what is it you don't want to hear?

# Solving a Rich Problem

- Finn wrote some equations that had an answer of 20.
- He only used one subtraction sign, one division sign, and one set of parentheses in each equation.
- What might his equation look like?

## **Overarching Habits of Mind**

1. Make sense of problems and persevere in solving them.
6. Attend to precision

## **Reasoning and Explaining**

2. Reason abstractly and quantitatively.
3. Construct viable arguments and critique the reasoning of others.

## **Modeling and Using Tools**

4. Model with mathematics.
5. Use appropriate tools strategically.

## **Seeing Structure and Generalizing**

7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

# Cultivating a Community of Adult Learners



# Constructive Struggle

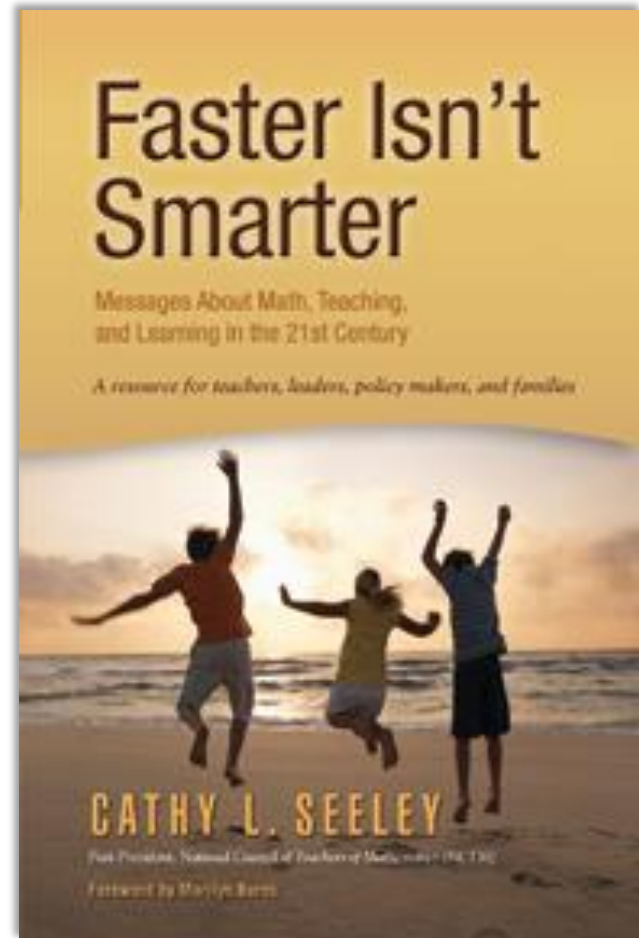
“All students need to constructively struggle—to get to the good stuff.”

—Cathy Seeley, *Faster Isn't Smarter: Messages About Math, Teaching, and Learning in the 21st Century*



# Constructive Struggle

- Rich Tasks
- Upside Down Teaching
- The Teacher's Role



# Problems Worth Solving

*“Teachers should choose (or develop) tasks that are likely to promote the development of students’ understanding of concepts and procedures in a way that also fosters their ability to solve problems and to reason and communicate mathematically.”*

*Professional Standards for Teaching Mathematics (NCTM, 2000)*

# Selecting High-Quality Problems

Engage students' intellect.

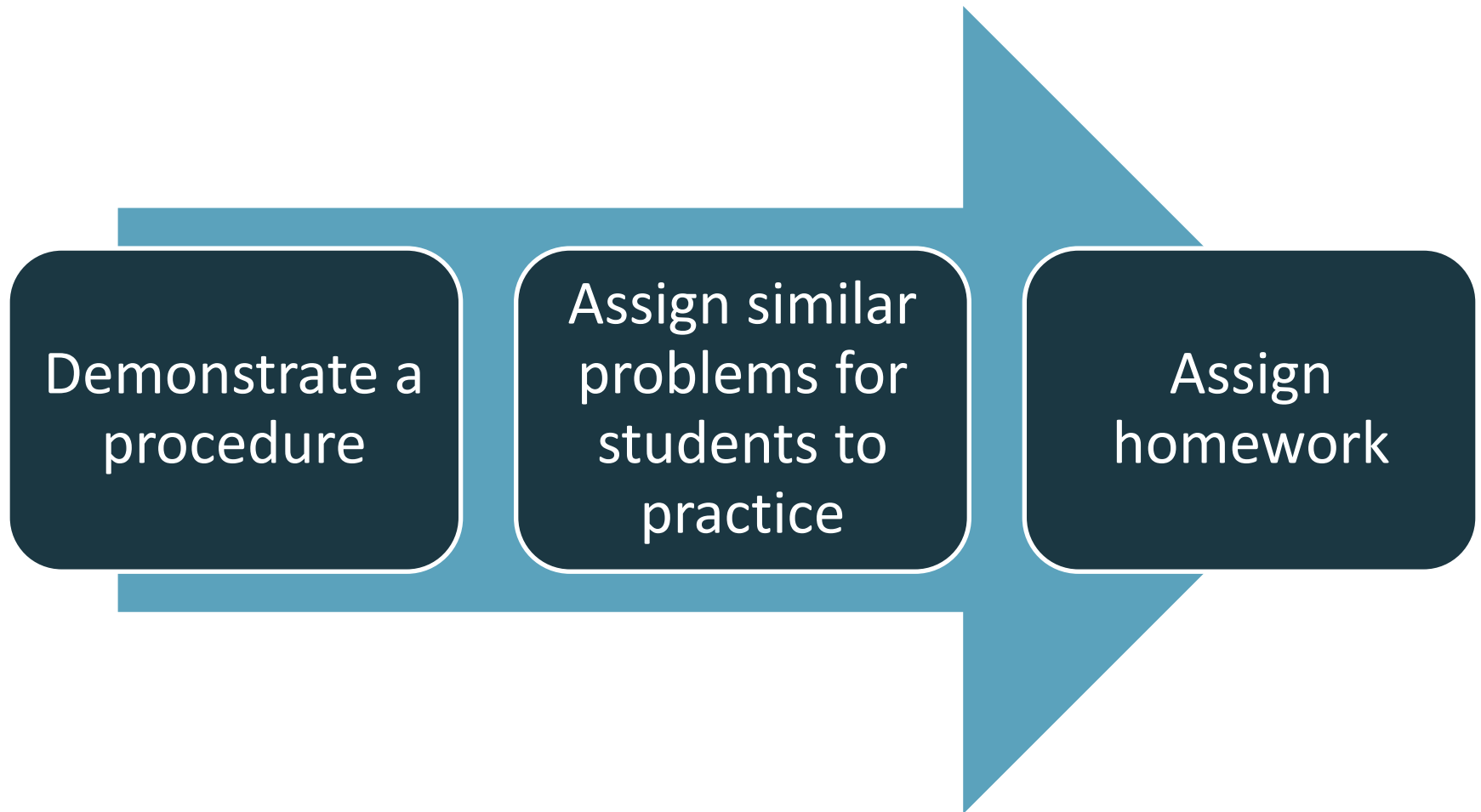
Develop students' mathematical understanding and skills.

Call for problem formulation, problem solving, and mathematical reasoning.

“As students engage in the constructive struggling needed for some of these problems, they learn that perseverance, in-depth analysis, and critical thinking are valued in mathematics as much as quick recall, direct skill application, and instant intuition.”

—Cathy Seeley, *Faster Isn't Smarter: Messages About Math, Teaching, and Learning in the 21st Century*

# Typical Flow of a Math Class



# Upside Down Teaching

Start  
with a  
rich  
problem.

Engage  
students  
in dealing  
with the  
problem.

Discuss,  
compare,  
interact.

Help  
students  
connect  
ideas.

Assign  
practice  
exercises.

# Implementing the Model

- What new skills and understandings do teachers need to feel confident with the model of upside down teaching?
- How does this inform what you need to do as a teacher leader?

# Cultivating Critical Thinking

“If we do our job well and make students think just a little harder, we can prepare them to take on some of the most difficult problems we face today as well as the unknown problems we are likely to face tomorrow.”

—Cathy Seeley, *Faster Isn't Smarter: Messages About Math, Teaching, and Learning in the 21st Century*



# Questions for Teachers

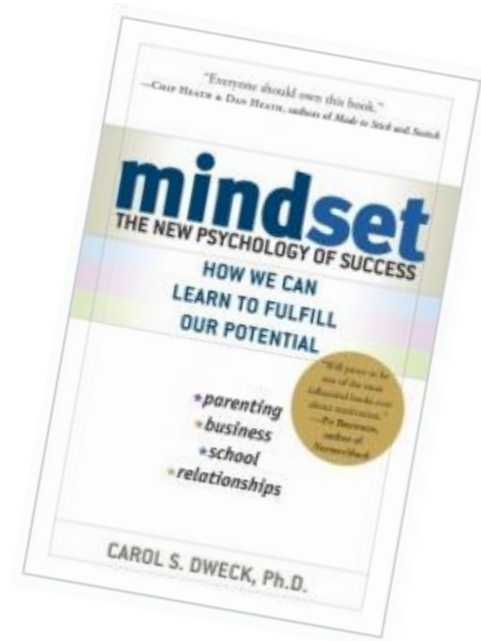
- What teaching strategies support or inhibit students' willingness to accept the struggle that goes with solving challenging problems?
- How can you determine the right amount of frustration and struggle for any given student on any given task?
- How can you help your students develop the confidence and persistence necessary to persevere through a challenge?

# Questions for Teacher Leaders

- What leadership strategies support or inhibit teachers' willingness to accept the struggle that goes with solving challenging problems?
- How can you determine the right amount of frustration and struggle for a community of teachers working to impact students' learning?
- How can you help your teachers develop the confidence and persistence necessary to persevere through a challenge?

# Growth Mindset

Some people believe that you are born with or without certain skills. Others believe that you can become better at anything through hard work and effort.



# Two Different Mindsets

Fixed	Growth
<ul style="list-style-type: none"><li>• Believe qualities are carved in stone.</li><li>• Thrive in their comfort zone.</li></ul>	<ul style="list-style-type: none"><li>• Believe you can substantially change your intelligence and abilities.</li><li>• Thrive when stretching themselves.</li></ul>

# The Impact of Praise

- Reaction to a challenge
- Enjoyment (attitude)
- Performance



Praise should deal, not with the child's personality attributes, but with his efforts and achievements.

*Haim Ginott*

## *The Power of “Yet”*

- What do the ideas in this article cause you to think about the students in your buildings or the teachers you support?
- How could developing a culture of “yet” impact student learning?
- How will you foster a culture of “yet” as you interact with teachers?

Making mistakes in learning is  
actually better than not  
making mistakes.

*Heuser and Metclaf, 2012, as reported in Educational Leadership, March 2014*

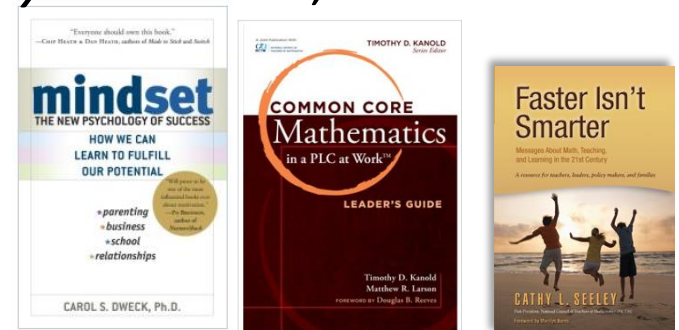


# Suggested Reading

Dweck, Carol S. *Mindset: The New Psychology of Success*. New York, NY: Ballantine Books, 2006.

Kanold, Timothy D. and Larson, Matthew R. *Common Core Mathematics in a PLC at Work: Leader's Guide*. Bloomington, IN: Solution Tree Press, 2012.

Seeley, Cathy. *Faster Isn't Smarter: Messages About Math, Teaching, and Learning in the 21<sup>st</sup> Century*. Sausalito, CA: Math Solutions Publications, 2009.





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